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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/334,646	06/17/1999	SHUNPEI YAMAZAKI	0756-1984	5565

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EXAMINER

HU, SHOUXIANG

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 08/20/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/334,646

Applicant(s)

YAMAZAKI ET AL.

Examiner

Shouxiang Hu

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 13 June 2003.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) See Continuation Sheet is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3,8,11-14,16-19,32-34,38-43,52,53,58-60,65,71-73,75-81 and 100-121 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☒ Certified copies of the priority documents have been received in Application No. 08/513,090.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 35.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

**Continuation of Disposition of Claims: Claims pending in the application are 1-3,8,11-14,16-19,32-34,38-43,52,53,58-60,65,71-73,75-81 and 100-121.**

## **DETAILED ACTION**

### ***Priority***

1. This application is a divisional of U.S. Application No. 08/938,310, filed on September 26, 1997, now U.S. Patent 5,959,313, which itself is a divisional of U.S. Application No. 08/513,090, filed on August 9, 1995, now U.S. Patent 5,731,613.

### ***Pending and Active claims***

2. Claims 1-3, 8, 11-14, 16-19, 32-34, 38-43, 52, 53, 58-60, 65, 71-73, 75-81 and 100-121 are currently pending and active.

### ***Information Disclosure Statement***

3. The information disclosure statement filed on June 17, 1999 fails to fully comply with 37 CFR 1.98(a)(2), which requires a legible copy of each U.S. and foreign patent; each publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. No copies were found in this application and/or in its parent case (08/513,090) for the two references: Hayzelden et al., *In Situ Transmission Electron Microscopy Study of Silicide-Mediated Crystallization of Amorphous Silicon*; and, Kakkad et al., *Low temperature Selective Crystallization of Amorphous Silicon*. It has been placed in the application file, but the information referred to in those two references has not been considered.

Art Unit: 2811

***Claim Objections***

4. Claims 104-121 are objected to because of the following informalities and/or defects:

Claims 104 and 113 each recite the term of "each respective second thin film transistor", but fail to clarify what is the relationship between it and the term of "a plurality of second thin film transistors" also recited in each of the two claim.

Accordingly, it should read as --each respective one of said plurality of second thin film transistors--.

Similarly, in claims 107 and 116, the term of "each respective second thin film transistor" should read as --each respective one of said some of the plurality of second thin film transistors--.

And, In claims 110 and 119, the term of "each respective second thin film transistor" should read as --said at least one of the plurality of second thin film transistors--.

Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 2811

6. Claims 1-3, 8, 11-14, 16-19, 32-34, 38-43, 52, 53, 58-60, 65, 71-73, 75-81 and 100-103 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang et al. ("Zhang"; US 5,403,772) in view of Kuribayashi et al. ("Kuribayashi"; US 5,233,447) and/or Matsueda (US 5,173,792).

Zhang discloses an active matrix type LC display device (Figs. 1-8A, particularly, Fig. 8A), comprising: a pixel matrix portion (104) having a plurality of pixels on an insulating substrate (107); and a peripheral driver circuit portion (101 and 102) on the same insulation substrate, thin film transistors (TFTs) in the driver circuit portion each having a channel forming region in one of the separate semiconductor layers (11a and 11b) provided on an insulating surface, wherein the channel forming region is provided in a region which can be regarded as effectively monocrystalline silicon (see col. 6, lines 13-15); and, the channel forming region contains impurities (a type of point defects) of carbon, nitrogen and oxygen at a concentration less than  $10^{18} \text{ cm}^{-3}$ , which meets the limitation of each channel forming region "containing carbon and nitrogen at a concentration of  $5 \times 10^{18} \text{ cm}^{-3}$  or less, respectively, and containing oxygen at a concentration of  $5 \times 10^{19} \text{ cm}^{-3}$  or less" recited in the claimed invention.

It is noted that, since the channel forming region in Zhang is formed with a method which is substantially the same as the one used in the claimed invention, the method used in Zhang is regarded as being inherently capable of forming the channel forming region having no linear defects or surface defects. In addition, one of ordinary skill in the art would readily recognize that it is always desirable to form the channel

forming region having no linear defects or surface defects for achieving good channel performance.

Although Zhang does not expressly disclose that the display device further comprises a buffer circuit in the driver circuit, one of ordinary skill in the art would readily recognize that such a buffer circuit is normally required for achieving desired driving output, as evidenced in Kuribayashi (see the buffer circuit (81) in Fig. 8; also see col. 8, lines 56-66). It is also evidenced in Kuribayashi (see Fig. 19) that an active matrix type display device commonly further comprises a memory, a decode and a display system for maintaining its basic display functionality.

Zhang does not expressly disclose that the peripheral driver circuit portion comprises at least two TFTs connected in parallel. Matsueda discloses an active matrix type LC display device (Figs. 1-12, particularly, Fig. 7), comprising: at least two TFTs (100A and 100B) provided on the surface of an insulating layer (110); a common gate wire (102); a common source wire ( $X_m$ ); a common drain wire (101), wherein the channel forming regions of the parallel-connected transistors are provided in separate semiconductor layers respectively. Matsueda teaches that the reliability of a basic control element comprising two or more parallel-connected TFTs is better than that of a basic control element comprising a single TFT.

It would therefore have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the parallel-connected TFTs of Matsueda into the driver circuit in the display device of Zhang with the driver circuit including a buffer circuit, per the teaching of Kuribayashi, so that a display device having both pixel and

Art Unit: 2811

driver portions formed on a same insulating substrate with good reliability in both of them would be obtained.

Regarding claims 11-14, 16-19 and 32-34, as mentioned above, an active matrix type display device commonly further comprises a memory, a decode and a display system for maintaining its basic display functionality.

Regarding claims 38-43, 52, 53, 58-60 and 65, it is noted that it is well known in the art that the carrier mobility and crystallization quality are strongly correlated with the Raman spectrum width ratio and intensity ratio, as evidenced in the prior art such as in Fig. 3 of Yamazaki et al. (5,608,232), which shows that the Raman spectrum width ratio of  $W/W_0$  is 2.0 or less; and, that the Raman spectrum intensity ratio of  $I/I_0$  is about 0.8 or more.

It would therefore have been obvious to one of ordinary skill in the art at the time the invention was made to make the device collectively taught by Zhang, Kuribayashi and Matsueda with the Raman spectrum width ratio of  $W/W_0$  being 2.0 or less and the Raman spectrum intensity ratio of  $I/I_0$  being about 0.8 or more, so that improved display device performance with high-mobility TFTs would be achieved.

7. Claims 104-121 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang et al. ("Zhang"; US 5,403,772) in view of Matsueda (US 5,173,792).

Zhang discloses an active matrix type LC display device (Figs. 1-8A, particularly, Fig. 8A), comprising: a pixel portion (104) having plurality of first thin film transistors (TFTs) connected respectively to a plurality of pixel electrodes formed on (or over) an



Art Unit: 2811

insulating substrate (107; see Fig. 8(A)); and a plurality of second TFTs forming a driver circuit (101 and/or 102) for driving the pixel portion, wherein each of the second TFTs has a channel area in a semiconductor layer (11a or 11b) crystallized from an amorphous silicon layer (see col. 6, lines 13-15)

Zhang does not expressly disclose that each (or some, or at least one) of the second TFTs comprising a plurality of channel areas connected in parallel.

However, Matsueda discloses an active matrix type LC display device (Figs. 1-12, particularly, Fig. 7), comprising a TFT with a plurality of channel areas (in 100A and 100B, separated in the channel width direction) electrically connected in parallel.

Matsueda teaches that the reliability of a basic control element comprising a plurality of parallel-connected channel areas is better than that of a basic control element comprising a single channel area.

It would therefore have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the parallel-connected channel areas of Matsueda into both of the first and second TFTs of Zhang, so that a display device having both pixel and driver portions formed on a same insulating substrate with good reliability in both of them would be obtained. In addition, the limitation of "subject to laser annealing respectively" as recited in the claims is a process limitation. And, it would not carry patentable weight in the claims drawing to a structure, because distinct structure is not necessarily produced. In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985).

***Response to Arguments***

8. Applicant's arguments filed on June 13, 2003 have been fully considered but they are not persuasive.

In response to applicant's argument that there is no suggestion to combine the references as Matsueda only teaches to have parallel-connected TFTs in the pixel portion and it is intended to solve a specific problem not related to the buffer circuit of the claimed invention, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Kuribayashi teaches that an active matrix type display device commonly comprises a buffer circuit, a memory, a decode and a display system for maintaining its basic display functionality. And, Matsueda teaches that the reliability of a basic control element comprising two or more parallel-connected TFTs is better than that of a basic control element comprising a single TFT. In addition, Zhang further teaches that that the TFTs of the driver portion and the TFTs of the pixel portion are both formed on a same insulating substrate. With these teachings, one of ordinary skill in the art would readily recognize that the reliability of the TFTs in both of the pixel portion and the driver portion should be concerned if the reliability of the TFTs in any of the pixel portion and the drive portion is concerned since all the TFTs are formed on a same substrate and function as

Art Unit: 2811

a basic control element. Therefore, one of ordinary skill in the art would readily recognize that the reliability of the display device of Zhang would be improved if the TFTs in both of the pixel portion and the driver portion including the buffer circuit are formed of two or more parallel-connected TFTs.

### ***Conclusion***

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shouxiang Hu whose telephone number is (703) 306-5729. The examiner can normally be reached on Monday through Thursday, 7:30 AM to 6:00 PM.

Art Unit: 2811

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

SH  
August 15, 2003

A handwritten signature in black ink, appearing to read 'Shouxiang Hu', with a long horizontal flourish extending to the right.

**SHOUXIANG HU  
PRIMARY EXAMINER**